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ROYAL MINERAL WATER HOSPITAL,
BATH.

NATIONAL HOSPITAL FOR RHEUMATIC DISEASES

"SPONDYLITIS DEFORMANS."

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SPONDYLITIS DEFORMANS.

SYNONYMS.

Arthritis of the Spine. "Poker-Back".
"Gardener's Back". Spinal Rheumatism.

DEFINITION.

SPONDYLITIS DEFORMANS is a more or less chronic pathological affection of the Bones, Joints, Ligaments and Muscles comprising the Spinal Column. As the name would suggest, there is usually some deformity produced. This may take several forms but shows essentially as an alteration of the normal contour of the spine.

Numerous types have been described and labelled largely according to the men who first studied them in any detail. Some of the conditions named in the following group may not appear at first sight to belong to the Spondylitis Deformans class, but an attempt will be made to show that these have a true place in the clinical picture.

1. KUMMELL'S DISEASE. (Fracture-Dislocation)
2. BECHTEREW TYPE. (1a cyphose heredo-traumatique)
3. STRUMPELL-MARIE TYPE. (1a spondylos rhizomelique).
4. TYPHOID TYPE. (Acute Infective).
5. OSTEO-ARTHRITIC TYPE.

This is at best an artificial classification, and, while for the sake of convenience, the different names are used, it must be remembered that they are types only and not separate entities. The only differentiation that one can see any evidence of is that between the Osteo-Arthritic and the Ligamentous. With reference to the so-called Rheumatic Diseases as a whole, the general trend of opinion is towards some common vital cause, or at least some train of events. Clinicians are so accustomed to the regular manifestations of Arthritis in the extremities, that its appearance in the Spine has excited the belief that this must be a separate disease. While Spondylitis is less common than other forms of Arthritis, it is much more common than is usually believed, and failure to recognise the less obvious cases has tended to wrap the whole subject in mystery. One of the objects of this Thesis will be



an attempt to show that Spondylitis, so far from being a distinct condition, is simply a manifestation of Arthritis.

There has been much speculation on the subject of selectivity or cell affinity, and there is no reason to suppose that the individuality of the patient or of the patient's separate cell groups do not play a part in the final locus of disease. The disturbance of the bio-chemical balance is as yet very imperfectly understood, but it seems possible that structures such as the Thyroid, with an intimate connection with the general metabolism, may have something to do in the matter of production or location of disease.

One has been very fortunate in the large number of cases of Spondylitis seen in the Royal Mineral Water Hospital, Bath. During the past four or five months some 30 cases have passed through the Wards. Complete investigation of each case was not always possible, but brief accounts of twenty-five will be given in the course of the paper.

HISTORY.

Although it is only within the last 30 - 40 years that Spondylitis has occupied any appreciable place in medical literature, it is by no means a new condition. Up to the time of his death, almost, SIR ARMAND RUFFER was engaged in a study of the various forms of Arthritis found amongst the Early Egyptians. He examined some thousands of graves in the Nile Delta, many of which dated back as much as 6,000 years. In his most interesting report, published posthumously, he states that he found more than a hundred cases of Spondylitis.

In 1884 STRUMPELL mentioned a progressive ankylosis of the spine and limb-roots, in his textbook. MARIE added to the clinical picture of the type which bears their names in 1893 and 1898. Since then LERI and others have described similar cases.

The Cervico-Dorsal type was not noticed until 1898, when VON BECHTEREW published an article on some cases.

In 1895 KUMMELL drew attention to a few cases of fracture-dislocation of the Spine, in which the patients survived. He remarked that there were very few on record. Since then, he has to some

extent modified his views, for in 1921 he stated that a fracture is not essential.

In consequence of this sudden interest in the subject, other investigators became intrigued. There has been a steady increase in the volume of papers. Some have confused the issue still further by adding fresh "types"; others have endeavoured to throw some light on the Etiology. Unfortunately, most of the writers have seen only a few cases, and their deductions consequently do not seem conclusive.

ETIOLOGY.

As with other forms of Arthritis very little is known of the cause of Spondylitis Deformans.

AGE.

The general opinion is that most cases are seen in the middle period of life. In one's own experience, however, the majority were much younger. The years 20 - 40 seemed the most usual for development. Occasionally a case is met with in childhood. Generally speaking, it is the ligamentous type that is seen in youth or early life. HENLA speaks of four cases of Traumatic Spondylitis that he saw in young people. The following is of interest in connection with an early onset.

1. E.J.H. 18 yrs. Male. Single. Clerk.

F.H. Father had Rh. Fever & Osteo-Arthritis.

P.H. Suffered with bronchitis as a child. Has always been subject to "throats". Constipated. No V.D. About 15 mos. ago slept out several times and was frequently chilled. Developed pains in bottom of back. Passed off, Then appeared in Thighs and Groins. L. Hip stiffened and back began to ache. Complains now of pain and stiffness in Lumbar region, Hips, & Knees.

EXAMINATION.

Pale and thin. Unable to stand alone. Back bent. Little movement in hips or knees. Muscles of thighs wasted. Screams when handled to any extent.

Teeth. Good.

Tonsils. Swollen, Follicles distended.

Chest. Thin, flat. Kyphosis. Movements fair. Little movement of Spine.

Heart. N.A.D

Abdomen. Complains of tight feeling.

Glands. Epitroch. Plus. Inguinal. Plus; Tender.

Reflexes. Normal.

X-Rays. Difficult on account of pain.

Dorsal. Thinning of Vertebrae. Ossification of
ligs. Starting. Thinning of Discs.
Slight tendency to lipping.

Lumbar. Mass between 4th - 5th V. ?new bone.

Hips. Close approximation of bones. No
lipping.

Knees. Bones appear "mottled".

Wass. Neg.

G.C. Neg.

<u>Blood Count.</u>	Reds.	7,460,000.	Lymphocytes.	35%
	Whites.	12,160.	Large Mono.	5%
	Hb.	92%	Polymorphs.	59%
	C.I.	.62	Eosinophils.	0%

This boy had been in several Hospitals before coming here and although many X-Rays had been taken of the limbs, nobody had attempted to examine the Spine in this way. Under the treatment which will be described in detail in its appropriate section, he showed considerable improvement.

SEX.

It is an indisputable fact that males are more often affected than females; probably about 80% are males. Theories advanced as to the cause of.

Spondylitis are many and varied, but when analysed the results may be summed up in two words. TRAUMA, INFECTION. Most writers have contented themselves with saying that some organism is to blame, others have gone a step further and accused the Gonococcus or the Sp. Pallida. Spondylitis certainly occurs in a small percentage of Typhoid fever, usually in the evanescent form, but occasionally remaining permanently. It would seem to be in the nature of a Peri-ostitis possibly due to Septic Emboli. KER was of this opinion; he thought that it is not of the same nature as the ordinary bone inflammation. MC CRAE quotes several cases which resulted in new bone formation. On one side the Lateral Ligament suggested ossification. He also mentions cases following Para-Typhoid; with lipping of the 4th - 5th Lumbar Vertebrae.

This would seem to be the only definite information there is of actual local infection, but the possible far reaching effects of other organisms must not be forgotten.

Probably the Gonococcal has had most adherents although, of late, the pendulum has swung in favour of Syphilis.

RAMEL and TURNER both believe that the majority of cases are due to G.C. infection.

Several investigators have published cases in which Syphilis has been found. COLDFIELD and LITTLE report that out of 111 cases of Bone Syphilis they found 9 showed Spondylitis. There appeared to be some variation in the types, which apparently corresponded somewhat roughly to the various later stages of Syphilis. SACHS has seen a considerable number of cases and he is of the opinion that while a few are non-specific the majority are syphilitic. WHITNEY and BALDWIN who found 100 casual cases, some 67 of spine involvement, are of the same mind. FRÄGLICH, TOMASONE, and MARSHALL to mention only a few, agreed with the above. An outstanding fact, not to mention a significant one, is that these cases not only gave in the majority of instances a positive Wass. test, but also showed marked improvement under Anti-Syphilitic treatment.

A rather interesting report came from ROBINEAU & GUTMANN, who observed two cases which developed after Anthrax and lasted some years until relieved by Laminectomy. One case showed an osteitis, the other resulted in a marked beak-like osteophytes.

Generally speaking, however, adherents of the Infective theory do not go further than naming some organism. It is now necessary to review the teaching of the "Traumatic" School. KUMMELL, in both his early and more recent articles, stated that an injury to the spine was essential. This is obvious when the classical picture appears. He goes on to say that the time of development is dependent on the severity of the Trauma. This is only what might be expected and certainly explains a number of cases which give a more or less definite history of slight or repeated Trauma. He states that there are three stages (1) Injury with pain, (2) Relative well being, (3) Later, may be years, pain, local or radiating to the extremities. Kyphosis.

FOSDICK JONES is in complete agreement as regards these stages.

VERNEUIL, FRÄGLICH, BANCHIERI, & FOSTER, HENLA & CLUZET all agree that an injury is frequently the cause, although the last named states that he has found a type which is distinct from that of KUMMELL'S.

Attention has already been drawn to the fact that possibly there may be something more than outside agents at work. As might be expected in this age of increasing attention to Bio-chemistry, several workers have put forward suggestions that possibly Arthritis in general may follow on some disturbance of the internal balance of the metabolic and similar centres.

PENDE thinks that the common cause is a Tropho-neurosis and describes a case which was complicated by Osteo-Malacia and general Arthritis. This is particularly interesting when compared with one of the cases at present under observation.

2. F.J.B. 51 yrs. Male. Married. Glover.

F.H. Nil. Has one child, 10 yrs. Healthy.

P.H. Rickets at 2 yrs. Some abdominal trouble at 3yrs. Always weakly.

Rheumatic History. Rh. Fever at 14 yrs & twinges of pain till 21. 18 months ago found he could not lift foot so well. Hip gradually stiffened, preceded by R. Knee.

Lumbar region has stiffened in last year. Thinks R. Knee has given out more lately. No pains in chest or abd. No V.D. history.

Wass. Negative.

G.C. Positive.

Examination.

Dwarfed Stature. Body appears normal size, but limbs are shorter than normal. Legs are bowed, and show typical Sabre - blade Tibiae. Feet deformed.

Teeth. All absent.

Tonsils. N.A.D.

Chest. Kyphosis & Scoliosis in Lumbar region. ?Occupation. Movements very poor. Chiefly Abdominal breathing.

Heart. N.A.D.

Abdomen. Very much compressed by Thorax.

Glands. Epitrochlear +. L. Inguinal +.

Reflexes. All normal.

X-Rays. Dorsal Vertebrae show ossification of Ligaments. Marked rarefaction of bodies, and thinning to a great degree of Discs. Scoliosis most marked at lower D. & upper L. region. Lumbar Vertebrae also thinned & compressed. ? Osteo-malacia. Tendency to lipping at sides of bodies.

<u>Blood Count.</u>	Reds.	5,680,000	Differential	
	Whites.	10,720.	Polymorphs.	49%
	Hb.	95%	Small L.	40%
	C.I.	.84%	Large L.	7%
			Eosinophils.	2%
			Basophils.	2%

Here is a middle aged man of dwarfed stature, Achondroplastic, showing signs of old rickets. There is partial collapse of the Lumbar Vertebrae and marked loss of density not only of the Vertebrae, which is fairly common in Spondylitis, but of the Pelvic bones as well. When to this is added the fact that the blood shows a positive G.C. one is almost compelled to come to the conclusion that Metabolism has played a part.

Ll. JONES has done a large amount of work on the Thyroid, and considers that it is largely responsible for many of the Arthritic manifestations. One has noticed in the majority of Spondylitic cases that there are signs of Thyroid deficiency - thinning of the hair and eyebrows, dry, rough, skin, sub-normal temperature, etc. Two cases show slight signs of exophthalmos plus enlarged Thyroid.

3. S.A.W. 29 yrs. Male. Single. Shop Assistant.

F.H. Father & Grandfather both had Rh.

P.H. Childhood healthy. Started flat-foot, age of 16.

9 yrs. ago L. Knee became swollen, no pain, This came later. Treated as T.B. in Plaster. Then R. Knee started. Hips stiffened. Back involved 2 yrs ago. Tender in Mid-D. Neck bad in last 9 mos. Bending developed in last year. Chest & ribs feel tight at times. Bowels & Bladder O.K. No. V.D. history.

Now complains of stiffness, Knees, shoulders, neck, and Back. Occasional pain R.Knee & Toes.

Examination.

Unable to stand alone. Back markedly bent. Wry neck. Eyes prominent, L.M. Shoulders, Knees, Swelling of Knees, & bony ankylosis L. Feet.

Teeth. A few missing. Some carious stumps. Pyorrhoea.

Tonsils. N.A.D.

Chest. Flat. Great Kyphosis. Movements poor. Spine rigid.

HEART. N.A.D.

Abdomen. Prominent. V. tender. Abd. Breathing.

Glands. Epitroch +. Inguinal Tender.

Reflexes. K.J.s. R. L -. Plantar Ankle

Wass. Neg.

G.C. Neg.

X-Rays. The Kyphosis made it impossible to take Dorsal V.

Cervical. Tendency to ossification of Ligs.

Lumbar. Lipping between 4th-5th. Ligs. are Ossified.

L. Hip. Complete bony ankylosis.

R. Knee. Marked Arthritis.

Blood Count.

Reds.	6,592,000.	Lymphocytes.	31%
Whites.	11,840.	Large Leuco.	3%
Hb.	91%	Polymorphs.	63%
C.I.	.69%	Eosinophils.	1%
		Basophils.	2%

This patient stated that his eyes had been prominent for some time, but he had paid very little attention to the fact. There was a slight enlargement of the Thyroid. One very noticeable point is the almost regular swing of the temperature. The normal seems to be about 97%, and for three or four days there is a swing to 98.4%, or slightly higher. This showed in practically every case examined. It has been suggested that one is dealing with a mixture of Hypo- and Hyper-Thyroidism, in the individual case, each endeavouring to predominate. At present there does not seem to be evidence to support this idea. In all probability the temperature is a manifestation of a slight exacerbation of the disease.

Hypotonicity of the Spinal muscles is said by some to play a large part in the production of the condition, and certainly many cases show a general lack of muscle tone.

BECHTEREW formed the opinion that Topho-Neurosis was responsible for this condition of the muscles. He considered that the primary factor was some disturbance in the centre of the cord. This lead to wasting of the muscles which in turn produced instability of the bones of the Spinal Column. He stated that heredity played a considerable part in these cases, and went so far as to term them in the cyphose heredo-traumatique. One or two of the cases under review in this paper give a family history which point to hereditary factors.

4. A.B. 43 yrs. Male. Married. Dock yard Driller. (Has been in Navy).
F.H. Mother & Grandmother had Rh.
 3 Brothers. 2 healthy; 1 with Spondylitis getting bent over. 1 Sister suffers with pain along Spine.
P.H. Healthy till age of 21. Then had a bad attack of Rh. Fever. Laid up for 5 months. 5 yrs later had pains in heels & ankles, working up to body. Gradually got more painful, and for last 10 yrs. has never been free. Now complains only of stiffness & pain in neck, shoulders & back. Noticed eyes got prominent about same time as onset of back trouble.
 Bowels O.K., Bladder, O.K., V.D. History nil.
 Has trouble with breathing & cramp in stomach.

Examination.

Marked stoop in Dorsal & cervical regions.
 Slight wry neck. Exophthalmos. Slight goitre. Very thinly covered.

Teeth. Some absent. Rest bad. Pyorrhoea.

Tonsils. Follicles distended.

Chest. Deformed, thin. Marked Kyphosis, & slight Scoliosis.

Heart. Bounding. Mitral Systolic murmur.
 2nd. sound accentuated.

Abdomen. Abd. type breathing. Prominent owing to bending.

Reflexes. K.J.s.++ Plantar++? R.Bab.A.J.s.+ Abd.+

X-Rays. Owing to the deformity it was found almost impossible to get pictures. The Cervical Vertebrae show early ossification of the Ant. Common Lig. & a lack of definition of the Post. Ligs. & Spines.

WASS. Negative.

G.C. Negative.

Blood Count.

		Differential.	
Reds.	5,764,000.	Lymphocytes.	19%
Whites.	10,000.	L.Mononuclear.	3%
Hb.	60%	Polymorphs.	76
C.I.	-52%	Basophils.	1
		Eosinophils.	1

This man had been in the Navy and since then has been at work in the shipyards under conditions which exposed him to more or less continuous chilling.

5. F.G. 54 yrs. Male. Single. Agricultural Labourer.

F.H. Most members of family have had Rh. Fever or Rheumatism. Mother had arthritis during pregnancy. Sister born with bent spine, never walked. Died age 4 yrs. Another sister had several attacks of Rh. fever & died of heart trouble.

P.H. Bronchitis as a child. Frequent conjunctivitis No V.D. history.

Rh. History. At age of 4 got a lump in R. Groin. In 'teens R. Hip became painful & he limped. At 50 this got bad & back stiffened - painless. Now has pain at times in back, but always in hips. L.Hip has same history but slower. Can use it O.K. No trouble with throat, but very bad teeth. No trouble with Bowels or bladder. Has occasional twinges about ribs.

WASS. Negative.

G.C. Negative.

Gradual wasting of R. Thigh.

Examination.

Bent forward from hips. Slight amount Wry neck. Eyes rather prominent. R. Leg & Thigh flexed at Knee & Hip respectively. No extension possible. Body wasted.

Teeth. A few absent. Remainder carious. Pyorrhoea. Alveolaria.

Tonsils. Septic.

Chest. Marked Kyphosis & general deformity. Poor movements. Scoliosis. Abdominal breathing.

Heart. Feeble.

Abdomen. Transverse folds.

Glands. Great pain in R. Iliac Fossa. Epitrochlear +

Reflexes. Knees absent. Plantar Flexor. Others Normal.

X-Rays. Dorsal Vertebrae appear fused into more or less solid mass, with involvement of Ligaments.

Lumbar Vertebrae show marked lipping & bridging at sides. There is marked ossification of the Ligaments, especially of the Post. Common Lig. which is definitely visible up to the 12th Dorsal V., there being lost in the general haziness. The Sacro-Coccygeal & S-Iliac Ligs. are also definite.

Hips. L. hip shows early Osteo-Arthritic changes. R. hip shows almost complete ankylosis & very indefinite outline.

Blood Count.

Reds. 7,568,000.
 Whites. 4,470.
 Hb. 85%
 C.I. 4.5

Lymphocytes. Not available.
 Large L.
 Polymorphs.
 Eosinophils.
 Basophils

6. E.G. 22 yrs. Male. Single. Labourer.

F.H. Father had a stiff back. Also Rh. Fever.
 1 brother suffers from Rh.
 3 sisters O.K.

P.H. Healthy childhood. About 10 yrs ago first noticed pain in R. hip, off and on. Both now affected.
 2½ years ago was chilled after football. Pain and swelling set in. Knees first, then legs and feet. Gradually worked up to Back, shoulders and neck, elbows and hands. Latter are free now. Feels tired and heavy in the afternoons. Has shooting pains across chest. Bladder and bowels O.K. No. history V.D.

Examination.

A tall, thin figure, with stoop at shoulders. Muscular wasting. Limited movement of shoulders, but not excessive stiffness. Stiffness of whole spine preventing normal bending.

Teeth. A few absent. Rest good. No pyorrhoea.

Tonsils. Removed at St. Barts. Hospital. ? Septic. (3 teeth removed at same time).

Chest. Flat, very slight movement in lower half, nil in upper. Remarkable mobility of L. Sterno-Clavic. Joint.

Heart. Pace somewhat erratic but N.A.D.

Abdomen. Abd. type of breathing. N.A.D.

Glands. Epitroch. +

Reflexes. K.Js plus. Plantar. ? Babinski. Ankle.. present.

Modules. Left elbow.

X-rays. Not available.

Dorsal Vert. appear indistinct. Slight calcification of Ligs. Tendency to lipping 8th, 9th. Inter-V. spaces diminished in upper area.

<u>Blood Count</u>	Reds .	7,488,000.	Lymphocytes	34%
	Whites .	12,800.	Large L	5%
	Hb.	92%	Polymorphs	59%
	C.I.	.61.	Eosinophils	1%
			Basophils	1%

It will be observed that some of these cases do not belong, so to speak, to the BECHTEREW type, in that they are concerned in the Cervico-Dorsal region of the spine, but one wishes to draw attention to the fact that other members of the family either at present or in past generations have shown some similar history.

Among the less commonly mentioned factors comes Trauma from congenitally long Transverse processes of the 5th Lumbar Vert. Apparently the process may rub on the Iliac crest and cause bursa or joint formation with the possibility of inflammation or of abnormal strain on the spinal ligaments. RICHARDS, BLANCHARD & PARKER, and GOLDTHWAITE have reported a number of cases.

What, then, is to be made of this mass of rather contradictory findings? The very fact that so many suggestions have been made exposes the folly of attempting to make a hard and fast rule. One must look upon the evolution of Spondylitis as a vicious circle. Infection, Toxicity, Trauma, all must be given a share of the credit. Time and again does one get a history of repeated slight Trauma. The hunting man who thinks little of a "toss", the farm labourer, the porter, the soldier, who has been "buried", are frequent subjects. If, in addition, excessive exposure to cold or wet be looked upon as injury, there is a good case.

7. F.A. 53 years. Male. Married 15 yrs. Widower.
Agricultural Labourer.

F.H. One brother had Rh. Fever.

Wife died at age of 37. 3 or 4 miscarriages.

Personal History. Healthy childhood.

Joined the Army in 1891. (7th Dragoon Guards).

Served 12 years and through S.A.War. Wounded in R. and L. arms and R. Leg.

Thrown from horse many times. Also a boxer.

Has been at farm work since 1903.

Rh. History. Blames Service abroad. First attack 4 years ago in R. Wrist, swelling up to elbow, and shoulder. Then across neck to L. Neck only trouble now.

Little movement and very painful.

Headaches.

All teeth out recently.

Bowels and Bladder O.K.

Mentality good.

Wass. Positive.

G.C. Positive.

Examination.

Holds himself straight but neck is stiff and head slightly turned up to the right.

Teeth all out. Were bad.

Tonsils. O.K.

Chest. Flat. Movements fair.

Heart. Normal.

Abdomen. N.A.D.

Reflexes. Normal except doubtful ankle jerks.

X-rays of Spine. Some bony lipping between 3-4-5-6th

Cervical Vertebrae anterior aspect. Probably

Anterior ligament is calcified.

Dorsal Vertebrae are very indefinite and Discs appear thinner than normal. ? commencing lipping or ossification of Ligaments especially about ribs.

Lumbar Vertebrae : Some Scoliosis.

Blood Count.

Reds	7,369,000	Lymphocytes	35%
Whites	10,880.	Large Mono	11%
Hb.	91%	Polymorphs	50%
C.I.	.62.	Eosinophils	3%
		Basophils	1%

This man led a very active life in the Army. He was a good gymnast and boxer and took part in mounted games, and states that he had many falls from his horse and in the Gymnasium.

s.T.A.V. 35 years. Married. Male. Waiter. (Was a groom 8 - 10 years before War). Served in Dorsets 4½ years. No Trauma. Egypt 1915. France 1916.

F.H. No children. Uncle had Rh. Fever twice after service in South Africa.

P.H. No illness before Army Service.

R.H. Dates first pains from time of sleeping out in France. Twinges in R.Hip off and on during War. First reported sick in 1919, Sciatic pains striking down to knee.

Xmas 1921, Great pain in Lumbar region.

Improved: since then can't bend to do up R.boot. Ribs fixed about a year. Says he braced himself back to control spasms of pain. Gets pain at night round lower ribs. Occasional pain in R. shoulder. ? old Trauma. Back feels weak when working.

Bowels and Bladder O.K.

Throat and chest O.K.

No. V.D. history.

Wass. Negative.

G.C. Negative. (Doubtful).

Examination.

Stands erect. Can only bend with back straight.

Teeth. A few missing. Others sound.

Tonsils. N.A.D.

Chest. Thin, flat. No movement to be seen or felt

Abdominal breathing. Very slight Lumbar

Kyphosis. Slight pain on pressure over Spine.

Heart. N.A.D.

Abdomen. Marked transverse folding. Tender on palpation.

Glands. Epitrochlear +

Reflexes. R.Side + + L.Side. +

General muscular wasting.

Fibrositic nodules in Lumbar region.

X-rays: Cervical. Tendency to ossification of Anterior Ligament.

Dorsal. General ossification of ligaments.

Slight bony lipping between 10 - 11th, and 11 - 12th Vert. (L. side).

Lumbar. Irregular bony masses between 2 - 3rd and 3rd and 4th Vert. near Tr. Process (L. side)

Discs in Dorsal region appear to be thinner than normal. Probably some absorption has taken place.

Here again one is dealing with a man who spent the early years of his life as a groom. In the Army, he states that on his return from Egypt he spent the first two nights sleeping in the rain on the Quay at Marseilles.

Infection certainly must be considered. Some of the cases, which seem to correspond to the commonly recognised Infective or Rheumatoid Arthritis group, with marked Ligamentous involvement are fairly acute in their onset. Whether the organism is specific, or is to be found in some septic focus such as the Tonsils, Teeth, or Bowel, it is difficult to say. At any rate one is justified in viewing the latter group with suspicion.

In spite of all that has been said, the feeling remains that there must be some lowering of bodily vitality, some preparation as it were, for the reception of the disease. Ill-health, worry, poor food or injudicious feeding are well known to be favourable to disease. The health of the Nation did not improve on War rations and one is struck by the frequency with which cases of Spondylitis have been met

since the War. The more the disease progresses the worse becomes the disturbance of the Metabolic balance, and vice versa. Acute toxicity and chronic toxicity merely vary in their time and expression of attack.

PATHOLOGY.

As with the majority of chronic conditions, opportunities for studying the pathology are rare. Few post mortems are obtained, and these are usually in the very advanced stages, and often not noticed save as a curiosity. The few autopsies that are on record will be mentioned later.

Examination of the Spine by Radiography has done more than anything to throw light on the condition, apart from the great help it has given in diagnosis. By the help of X-rays we are able to determine not only that Spondylitis is present, but also that there are, as had been described, types involving the ligamentous structures and the bones, separately. This brings the condition into line with the usually accepted divisions of Arthritis. While the two types may be and often are found in the same case they are, originally, distinct. The rheumatoid type starts primarily in the various ligaments of the Spinal Column. The Osteo-Arthritic type produces bony lipping, and Exostoses from the first. The former would seem to be by far the commoner and will be considered first.

The ligaments most commonly involved are the Anterior and Posterior common Ligaments. The Supra Spinous Ligament is in a fair percentage of cases involved as well, and may stand out in the Skiagram as a distinct line as much as $\frac{1}{4}$ " broad. The Ligament Subflava is rarely involved to any extent. In the general involvement are usually to be found the Anterior and Posterior Costo-Transverse and Capituli Costae Radiata Ligaments. The Intervertebral Discs are largely composed of fibrous tissue, are in intimate contact with the Anterior and Posterior Ligaments, and absorption and calcification is quite common.

The Anterior Common Ligament descends on the Anterior and lateral surfaces of the bodies of the Vertebrae and gradually becomes divided into

three more or less distinct strips. Its fibres are in intimate connection with the other ligaments of the spine and with the Intervertebral Discs and bodies of several Vertebrae. So that the net result is a sheath of fibr-ligamentous tissue almost enclosing the Vertebral Column.

Specimen 1. Figure 1. from the Museum of the Royal United Hospital, Bath, illustrates this ossification very well. The Anterior ligament is a smooth sheet spreading from top to bottom of the Cervical Vertebrae. The Posterior and Lateral Ligaments are also involved. X-rays and photographs of the specimen will be found in the Appendix.

Seeing that one Ligament or set of Ligaments may be affected, is there any reason to suppose that the others in the same neighbourhood and of the same Histological structure, may not also be involved? Probably the Bent or Kyphotic Spine is more commonly observed, and here the Anterior ligament is to blame, assisted of course, by the natural tendency to drop the head. But in a larger number of cases one has observed that there is marked calcification of the Posterior and Supra-Spinous Ligaments. This has the effect of preventing a forward curvature, and tends to produce the "Poker-Back" Spine. One is, therefore, of the opinion that the final result largely depends on the area of onset, combined with the rate of progression. The Intervertebral Discs consist of an outer concentrically arranged layer of fibrous tissue, and a central area of fibro cartilage. They are rather larger than the Vertebrae and project a little in consequence, thus causing a slight bulging of the common ligaments at these points. The Discs in the Cervical and Lumbar regions are slightly thicker in Anterior section, while those of the dorsal area are thinner. The crural Ligaments attaching the Diaphragm to the Vertebrae are also liable to involvement with consequent grave interference with respiration. RUFFER states that he found several specimens in which these were completely ossified. He states that this was also the case sometimes with the Spinal muscles generally-almost complete ossification of the muscles lying in the Vertebral groove was shown in one or two specimens.

The Vertebral bodies appear in many cases to become rarefied and it is a nice point as to whether the ligaments have gained Calcium at the expense of the bone, or as the result of an entirely separate process.

In some of the more acute Infective processes there is certainly some periosteal involvement.

The Bacillus in some cases has been found in the bone marrow; in cases of Typhoid Fever a distinct swelling is often apparent in cases of Typhoid Spine. Nathan has carried out a number of experiments on dogs. He has inoculated them with various organisms - chiefly Staphylococci - and states that he has been able to produce lesions in various parts of the body, identical with those seen in human arthritis. Spondylitis was amongst these. There was, he says, an Endosteal and Sub-Periosteal inflammation, along with a sterile intra-peri and para-articular exudate. This occupied the Epidural space and notches. Lipping is to be expected in these cases but is not always present.

SACHS describes a Senile type in which there is thickening of the periosteum and meninges, accompanied as a rule by lipping. The true Osteo-Arthritic spine occasionally shows as a solid mass of bone throughout its length. In consequence, no movement whatsoever is possible.

KUMMELL'S Disease, or the Traumatic type, shows this true Osteo-Arthritic change very well. In the severe case there is usually a fracture of the Vertebrae, often accompanied by compression or dislocation of a body or bodies. A kyphosis probably results and there is an almost immediate attempt to repair. In the course of time the whole area is usually encased in new bone, and there may be Exostoses at sites remote from the injury.

Specimen ii (illustrated), from the Museum of the ROYAL UNITED HOSPITAL, BATH. There is marked new bone formation, bridging the site of injury and extending well on to adjacent Vertebrae. In addition the Ligaments under the X-rays show some calcification. The man lived 7 years after his accident and then committed suicide on account of pain. It must be understood that this is an extreme case, and as has already been stated KUMMELL has somewhat modified his views as regards the need of a fracture. Slighter Trauma is also productive of bone changes. In fact the majority of Osteo-Arthritic spines give a history of small accidents.

9. C.M.L. 57 years. Single. Female. Household Duties.

F.H. Mother Rh. Gout. Her family had T.B. badly.
Father Rh. Fever.

3 sisters : 1 living is "Mental".
1 living suffers from a weak heart.
1 dead. Heart disease.

P.H. Weak heart. Most Children's ailments.
 Several cycling accidents - Broken Patella.
Injuries to back. 5 years ago took the
 weight of a falling ladder upon lifted arm.
 Strained muscles of Lumbar region.
 18 months ago received a blow in the Dorsal
 region from a door, while stooping. A
 swelling appeared 6 months ago. Very
 painful. Cleared up when a bloody discharge
 came from Rectum. Other joints O.K., except
 injured knee.
 Periods regular. Stopped 11 years.
 "Whites" since a child.
 Bowels and Bladder O.K.
 Sight moderate, Glasses. L. Eye weak.
 Double V.

Mentality. Fair.

Wass. Negative.

G.C. Positive.

Examination. Holds herself fairly straight. Very thin.

Teeth. False.

Tonsils. N.A.D.

Chest. Flat, bulging at the sides. Very poor movement.
 Kyphosis ++ Lordosis + Pain.

Heart. N.A.D.

Abdomen. Bulging. Abdominal breathing.
 Liver palpable and very tender on taking a
 deep breath.

Reflexes. Normal.

Joints. Creaking of both knees.

Pain in both ankles.

X-rays. Cervical V.? Ossification of Anterior Ligament.

Dorsal V. Bony lipping on R. side of 2,3,4, forming
 a bridge. Ossification of Ligaments from
 5th to 12th.

Lumbar V. Ossification of ligaments down to
 4th V.

Blood Count. Not Available.

Reds.	Lymphocytes.
Whites.	Large
Hb.	Polymorphs.
C.I.	Eosinophils
	Basophils

Generally speaking, there is only slight
 evidence of outgrowths. These appear as a rule on
 the margins of the Vertebrae. Those at the inferior
 margin tend to bend down, while the upper ones turn
 up. If the process continues the "beaks" meet and
 a bridge of bone between the adjacent bodies forms.

Sometimes these bridges become very massive, and it may be easily seen how difficult, nay, impossible, movement of the Spinal Column will be. Several specimens (illustrated.iii) from the same Museum show this bridging well. There is almost complete loss of the Discs (the little remaining being calcified), and there is also slight eburnation of their surfaces. This is rather unusual, although RUFFER reports one or two examples. The bone which has joined the bodies is about $\frac{1}{4}$ " thick over the strongest part and gradually tails off on the bodies. There are in addition numerous small exostoses.

10.

G.S. 60 years. Male. Single. Farm Labourer.

F.H. Nil.

P.H. Nil.

Rh. H. 9 years ago pain started in L.Hip and Knee and across Loins. Gradually got worse. Pain in chest recently. Frequent sore throats. Can't bend at hips. Always had a lot of heavy lifting to do, strained himself several times.

Bowels and Bladder O.K.

Mentality. Fair.

Wass. Negative.

G.C. Negative.

Examination. Tall heavy man. Scissors gait. Needs stick.

Teeth. Top false. Pyorrhoea +

Tonsils. N.A.D.

Chest. Slight kyphosis. Fair movements.

Heart. N.A.D.

Abdomen. Tender on palpation.

Glands. Epitrochlear + Inguinal +

Reflexes. K.J.S. normal. Others doubtful.

X-rays. Dorsal Vertebrae shows a mass of new bone on R. Side of 11-12th Vertebrae.

Lumbar Vertebrae shows lipping of 2-3 & 3-4 on R. Side.

Hips show advanced Osteo Arthritic changes.

Blood Count.

Reds.	Lymphocytes.
Whites.	Large
Hb.	Polymorphs.
C.I.	Eosinophils.
	Basophils.

This man shows little or no signs of Ligamentous involvement, but seems to be purely Osteo-Arthritic.

It is rare to find that the Costo-Vertebral joints are affected, although they are so frequently surrounded by the involved tissues. An interesting point may be raised here. X-rays often show a sharp line of demarkation at the level of the 12th Dorsal Vertebra. There is usually more or less immobility of the Chest and if more Post Mortem examinations were possible, it is very likely that some cases at least might show Synovial changes comparable with the changes in other Rheumatoid Joints.

Attention has been drawn to the fact that a few cases have exhibited symptoms referable to some affection of the Posterior Nerve Roots. BECHTEREW gave a very full description of one such case and was later fortunate enough to obtain an Autopsy.

There was marked atrophy of the Discs and fusion of the bodies. The Spinal Canal and inter-vertebral foramina, it is interesting to note were not encroached on. Chronic meningeal changes were found in the upper dorsal and thoracic regions, chiefly involving the Pia and Arachnoid membranes. In addition the posterior roots, and to some extent the anterior roots, showed degeneration, especially in the upper part of the cord. In the cord proper there was a found degeneration of the columns of Goll and Burdach. BECHTEREW said that this was secondary to the root degeneration, which in turn was secondary to alterations in the spinal ganglia which were adherent to the dura.

PLAZA quotes one case following Trauma. There was great pain in the back, and an operation was suggested with a view to removing any bone which might be causing pressure. The patient, however, unable to bear the pain any longer took refuge in suicide. An autopsy revealed, that there was compression of the 7th & 8th roots. An operation would have been feasible.

SCHOU is of the opinion that exostoses may impede the circulation and produce the pain without any real compression. Or, he says, the root may degenerate under pressure and pain cease. NATHAN'S findings may be referred to again in this connection. May not the exudate besides causing pressure produce a local meningitis?

11. W. 58 yrs. Female. Single. Housework.

F.H. Nil.

P.H. Healthy until about 5 yrs ago. Then had a fall backwards from a stile. Unable to move for some days. Since then Complained of inability to walk properly. Feet twist in.

Tendency to fall. Twinges of pain in hands at times. Feet swell. Rather better last 5 mos. Periods stopped 3 yrs. ago.

Examination.

Small and thin. Spastic gait. Tends to roll to sides.

Teeth. A few left. Pyorrhoea.

Tonsils. N.A.D.

Chest. Thin, flat, N.A.D

Abdomen. Tender in R.I.F.

Reflexes. K.J.'s: Normal. Plantar: Bab. Ankle ? Abd.?

X-Rays. Slight lippling 8th, 9th 10th Dorsal Vertebrae.

Knees. Bony lippling in both joints, esp. in Left.

Wass. Neg.

G.C. Neg.

Blood Count.

Reds.	6,816,000	Lymphocytes.	40%
Whites.	8,640	Large Mono.	5%
Hb.	94%	Polymorphs.	50%
C.I.	.69	Eosinophils.	0%
		Basophils.	5%

This patient was considered for a long time to be a case of either Spastic Paraplegia or of Disseminated Sclerosis.

12.

A.F. 52 yrs. Male. Married. Foreman (Heavy work).

F.H. Nil.

P.H. Healthy child. Touch of Rh. in shoulders 25 yrs ago. L, off and on since.

Appendix removed in 1902.

7 yrs ago fell from a height, & injured back. 4 mos laid up. Lumbago followed shortly after.

2 yrs ago was in a motor smash & injured back. Slight

9 mos. ago hard fall on back. Has been unable to work since. Pain getting worse last 2 mos.

Bowels erratic. Pain in breathing.

Examination.

A tall thin man. Slight stoop.

Teeth. A few absent. Rest carious. Pyorrhoea. Tartar.

Tonsils. Swollen, Follicles distended.

Chest. Flat, Slight Kyphosis. Movements Nil.

Heart. Enlarged N.A.D.

Abdomen. Abd. breathing N.A.D.

Reflexes. K.J. + Plantar. R. Bab. L. Flexor Abd. Ankle.?

Nodules. Over L. Spine.

WASS. Neg.

G.C. Neg.

C.S.F.

Very slight amount of Sugar present.

Cells incr. in number. 40 counted.

X-RAY. Slight Scoliosis Mid-Dorsal region. Ossification of Post. Inter Spinous Lig. & other Ligs. in Dorsal. Rarefaction of bodies of Vertebrae.

Blood Count.

Reds.	Lymphocytes.
Whites. 10,880.	Large.
Hb.	Polymorphs.
C.I.	Eosinophils.
	Basophils.

MALLING conducted autopsies on 25 cases, but of these few had exhibited marked signs of SPONDYLITIS in life. Eleven showed more or less severe involvement. Five were free from exostoses and these were below the age of fifty. He found no signs of internal pressure on the cord, but thinks that there may have been some root pressure.

VANDERHOOF states that he has seen some 87 cases of hypertrophic Spondylitis in seven years. Forty had abdominal pain and twentyseven showed no visceral disease. He thinks also that pressure from some exudate or from new bone is largely productive of pain.

MODINOS is of the same opinion but thinks that there is frequently some narrowing of the foraminae.

13.

A.M.B. 43 yrs. Female. Married. Housewife.

F.H. Nil. Has one child healthy.

P.H. Quite healthy. Periods regular. Erosion of Cervix operated on about 6 mos. ago. Had "Whites" for a long time. No M.C. Few sore throats. Finds herself more subject to colds lately, and they are harder to throw off. Short of breath. Has had pain in Left side of chest for some time. No Rheum. history.

18 days ago complained of great pain in abdomen from Xiphi-Sternum to Umbilicus. Attacks of vomiting were frequent, especially after food. Fainting and staggering gait. Feels as if she would fall if she bent forward. Felt need of some support for back. Now is getting better. Morphia controlled pain to some extent.

Examination.

A thin, anaemic looking woman.

Teeth. Good. Slight pyorrhoea.

Tonsils. Injected.

Chest. Thin and flat. Slight Kyphosis in Dorsal region. Movements fair. Pain on palpations of L. lower ribs, especially towards the spine. Apparently in course of Intercostals. Great pain on touching 10-12 D. V. on L.

Heart. Enlarged. Apex in 6th. space external to nipple line.
Rapid. No murmurs or thrills.

Abdomen. Tenderness in L.Hypoch. and L.Iliac Fossa. No enlargement of Spleen or Liver to be made out.

Glands. No enlargement.

Reflexes. K.J's. Present. Plantar. Babinski, Oppenheim.?
Epigastric. Present Abdominal. Absent.
Slight intention tremor. No nystagmus.
Pupil reflexes rather sluggish.

X-Rays. Antero-lateral. Marked kyphosis especially in upper D.
Dorsal. Slight calcification of Lat. lig. Slight lipping or bridging of spaces between lower 4th., 5th., and upper 6th. bodies. This may be calcification of the Ant. lig. Distance between bodies varies enormously, 3rd. and 4th bodies are almost touching in front and showing a gap of $\frac{1}{2}$ " behind.
Antero-Post. Spaces lessened between 7th - 10th. A sheath of calcified ligaments surrounds this part of the vertebral column. Best marked on L. side. Supra-spinous lig. shows up as a fine continuous line. Tendency to lipping 8th, 9th, 10th.

Lumbar. Nil to note.

Wass.
G.C.
Blood Count.

Reds.	4,576,000	Lymphocytes	46%
Whites.	12,160	Large Mono.	8%
Hb.	70%	Polymorphs.	46%
C.I.	.76	Eosinophils.	0%
		Basophils.	0%

This case proved very puzzling to the Surgeon who first examined her, He was tempted several times to open the Abdomen, but fortunately held his hand. Bismuth meals showed no signs of Abdominal dis-organisation. It was not until an X-Ray of the spine was examined that the true condition was discovered.

14.

G.P. 44 yrs. Male Married. Warehouseman (heavy lifting).

F.H. Nil. No children. Wife no M-C.

P.H. Sore throats frequent at one time. Teeth were all removed on account of sepsis. Feels better since then.

3 YRS. ago started with pain, wind and waterbrash (abdomen). Gets periodic attacks. A rest and careful dieting clears this up. Has noticed curve of back slowly advancing for some time.

Examination.

A short sturdy man. Round shouldered. All movements good except in upper Dorsal area.

Chest. Thick. Kyphosis upper Dorsal. No pain.

Teeth. All out.

Tonsils. Swollen and showing follicles.

Abdomen. N.A.D.

Reflexes. Normal.

Heart. Haemic murmur.

X-rays. Marked Kyphosis of Cervico-Dorsal Spine. Anterior and Lat. Ligs. ossified. Bones almost completely enclosed by calcified ligaments.

Blood Count. Not available.

Reds.	Lymphocytes.
Whites.	Large Leuco.
Hb.	Polymorphs.
C.I.	Eosinophils.
	Basophils.

This man showed to a slighter extent the symptoms of the previous patient.

As mentioned in the section devoted to Etiology, some writers have suggested that Spondylitis is a result of some Trophoneurosis, due to neural disturbances. Von BECHTEREW was of this opinion, and held that changes in the skeletal muscles resulted in what was practically a "wilting" of the vertebral column, either in whole or in part. BEER also holds this theory. In this connection it must be born in mind that Anterior Poliomyelitis sometimes results in a kyphosis. HIBBS states that he has had several cases of the sort and that he found a Spinal graft was often very successful, not only in removing the deformity, but also in preventing any further progress.

Whether the meningitis and the following atrophy begin as a direct infection or appear as the result of pressure from without is a difficult problem

to answer. Certainly it would seem that both are possible, but when one realises that the cord is practically supported by fine strands of the Posterior ligament - a structure which frequently shows ossification - the balance seems to swing in favour of the latter theory. Some of the cases under review seem to illustrate this point. There is evidence of very slight lipping and no kyphosis worth mentioning. An examination of the C.S.F. showed a deficiency of sugar in a clear fluid which failed to react to the Globulin test. One is not justified in jumping to the conclusion that there is a definite meningitis present, but taken in conjunction with the symptoms which point to cord degeneration, one feels that there is a strong probability of some such pathological condition.

There is a lack of references to the Blood in the literature of Spondylitis, and one felt that something might be learnt from a routine examination. The frequency of ossification of the ligaments naturally suggested possibilities of some disturbance of the Calcium balance, such as has been recently reported in the case of Gout by COATES & RAIMENT. Accordingly a series of estimations were made, using FRAMER'S method. Control bloods were also tested, and all reagents carefully standardised. The result showed that there was no apparent disturbance in the amount of Calcium normally found. This is generally taken to be 9-11 mgs, per 100 c.cms, blood.

Blood counts were then considered and each case was taken in turn. Throughout, care was taken to see that the specimens were obtained at the same time of day, and by the same method. About 2½ hours following breakfast were allowed to pass, and the patient rested before the thumb was pricked. This was before any treatment such as Baths, etc., which tend to produce an erratic count. At first one was rather astonished at the high Red count but as the series continued the same picture appeared. Usually one found that the Reds were increased to about 6½ million: sometimes to almost 8 millions. The Haemoglobin was in the neighbourhood of 90%-95% (Gower's Haemoglobinometer).

The white cells, also, were increased, usually to about double the normal number. Differential counts did not show a marked departure from the normal, although in one case the Large Mononuclears rose to 16%. Generally, there was a slight increase in the percentage of Lymphocytes.

This picture is rather similar to the one obtained in Gout. CHALMERS WATSON, in 1900, noted a Lymphocytosis in the quiescent periods of Gout, and a sudden increase during the acute stages. MUNRO has written to the same effect; he also remarked that many cases of Chronic Infective Arthritis showed a Leucocytosis. This does not appear to have been so marked or so regular as in the present series.

Case 13 gave an extremely interesting Blood-Picture. She did not show the usual increase of Red Cells, but their appearance in the stained film (Leishmann), was very unusual. In many fields there appeared numerous Red Cells which showed a row of deeply blue-stained dots round the periphery. The centre took the stain in the normal way. The appearance was not at all like the generally accepted one of Punctate Basophilia. A few nucleated Reds were seen, and some "Ghosts". The possibility of Lead poisoning was excluded, and also of Pernicious Anaemia. One came to the conclusion that this was an example of an acute Toxaemia, which was causing a disturbance in the Bone-Marrow. This was the patient's first attack of pain, etc., and one wished that it had been possible to follow the case up and obtain further films.

Unfortunately time would not permit of an investigation into the Sugar content of the Blood. HOLSTI found that in some patients suffering from Chronic Arthritis, there was Hyper-Glycaemia, and usually signs of Thyroidic disturbance present.

Complement Fixation Tests for both Syphilis and Gonorrhoea were carried out in most of the cases. A few showed positive results to the latter, but there does not appear to be any basis for the sweeping statements of some authors that Gonorrhoea is wholly responsible. It certainly plays a part, and, maybe, a large part, but is probably only incidental. Only one case gave a positive Wass. reaction.

The Urine showed no departure from the normal.

Septic Foci have already been mentioned; in all the cases diligent search was made for any possible seat of the kind. In many cases the Teeth were bad, often extremely carious, and the majority of mouths showed Pyorrhoea. Others had artificial dentures, which alone was suspicious.

The Tonsils were often large, and on pressure, showed caseous masses in the crypts. In one or two instances they had been already removed because of sepsis.

Some of the patients complained of Constipation. It was not easy to decide if this was due to the disease or to the almost compulsory sedentary life. In one particular patient, improvement resulted from a vaccine prepared from his stool. Possibly Intestinal Sepsis is an important factor.

15.
M.R. 30yrs. Male. Packer (Motor Engineer before the War.)
F.H. Good.No children.I premature birth&?early M-C.
P.H. Army 1914-1919.Infantry.Wounded in legs.No trouble since.Sand-fly fever 3 times.
 P.U.O....?Malaria.
R.H. Slight swelling in R.big toe-Winter 1919.
 Worse " " " " " " " & instep Winter 1920.
 13 mos. ago thigh and back involved.
 Pain at times in R.hip and shoulder.
 Chief pain is in small of back,when turning or straightening up.Occasional pains round ribs.
 Bowels & Bladder O.K. No V.D.history.

EXAMINATION

TEETH Can't stand erect.Bends from hips.
TONSILS Good.
CHEST Swollen,R.Septic. ? L.ditto.
HEART Immobile,flat.Abd.breathing. Kyphosis.Scoliosis.
 Pulsations seen about nipple.No thrills.Apex beat 5th.space, $\frac{1}{2}$ in.external to nipple.Loud blowing Diastolic Murmur heard on Sternum.
 Aortic incompetence.
 B.P. Arm S 100. D 50. Leg S 140.D.?
ABDOMEN N.A.D.
GLANDS Inguinal,plus.
REFLEXES Normal.
WASS Neg.
C.C. Neg.(doubtful).

X-RAYSCERVICAL

Lateral view shows v.slight ossification of Ant.Lig.No bony changes.

DORSAL

Ant.Post.view shows apparent fusion of Bodies.
 Very hazy outline.
Lateral view shows a continuous line of calcified Ligament from top to bottom.V.little detail in Bodies.Spaces almost indistinguishable.

Lumbar Vertebrae. Bridge of bone uniting 12th & 1st Lumbar on R. side.

Blood Count.

Reds.	6,944,000	Lymphocytes.	36%
Whites.	14,880	Large Mono.	3%
Hb.	91%	Polymorphs.	60%
C.I.	.65%	Eosinophils	0%
		Basophils.	1%

Symptoms and History

As a rule the earliest complaint of a patient is a feeling of weakness or loss of elasticity in the back muscles. Then comes pain, which is variously described as "shooting", "dull aching" etc. In cases with root involvement, the back is often attacked late.

One has frequently been told .. "it worked up from the feet", or "From the knees or thighs" as the case may be. ...

16

J.B. 24 years Male. Single. Chauffeur.

F.H.

P.H. Healthy until 3 years ago. Then states he was chilled at football. Pain started in L thigh and leg. Cleared up after a time. Shoulders started to get round and to ache. Weakness in back. Now complains of periodical attacks of inability to move about. Back is immobile and L. hip also. Has pain in L groin on movement. Pain in L. knee. Pain in middle of spine. 4 months ago a lump appeared over Sacrum. Bowels fair. Has several teeth out after X-Ray. No colds or throats.

EXAMINATION.

A tall, thin youth. Muscles wasted; bones showing. Marked Kyphosis in dorsal region. Spine almost immobile. Very limited movement of neck. L. hip ditto.

TEETH A few missing. One or two carious. Swelling over Sacrum

TONSILS N.I.L

CHEST Very thin. All ribs showing. Kyphosis upper part. No movement. Great tenderness over mid-spine.

ABDOMEN Bulging; abd. breathing.

GLANDS. Inguinal, very tender.

REFLEXES K.Js. plus. Plantar ? Bab. rest normal.

NODULES. ... Elbows.

WASS ... Neg

G.C. ... Pos.

BLOOD COUNT REDS 7.456,000

WHITES 19840

Hb 90%

C.I.6°

LYMPHOCYTES . 44%

LARGE MONO . 1%

POLYMORPHS . 54%

EOSINOPHILS . 1%

Basophils . 0%

X-Rays

D ORSAL Absorption of discs in upper part.

Ossification of ligaments marked.

Abrupt stop at 12th D.V.

Lumbar Nil.

17.

W.E. 54 years. Male. Married. Miner.

F.H. ... Mother had Rheumatics.

Wife healthy. No miscarriages.

7 children living.

1 dead, aged 3 months. (Mental)

P.H. ... Healthy as a child.

Typhoid Fever at 24.

Slight injury to chest age 30

Erysipelas.

More frequent coughs and colds lately. Can't get rid so soon.

Bowels. O.K.

Bladder O.K.

No history of V.D.

No sore throats.

R.H. ... 14 years ago first had pain and swelling behind right knee, off and on. Both knees now involved. Getting worse. Pain and stiffness of L. Arm and shoulder. Pain in back started about 3 months ago.

Treated in R.M.W.H. June 1924. M.B.

EXAMINATION. Well built. Stand fairly erect. Cannot stoop well. Limited movement of shoulders and knees. Wasting.

TEETH. .. A few absent. Rest are carious. Pyorrhoea + stumps.

TONSILS . Swollen. Follicles distended.

CHEST. Flat. Depressed. Sternum. Slight Kyphosis. Very poor movement. Pain on deep respiration.

HEART .. Very faint. N.A.D.

ABDOMEN. .. Abd breathing. Tenderness in R.Hypoch.
Glands .. Epitrochlear+ Inguinal+ Tender L.
REFLEXES .. K.J.+ Plantar+. Ankle Clonus+.

X-Rays : Dorsal Spine shows entire lack of definition from 5th V. downwards. Apparent fusion of bodies of V. Costo-vertebral joints not clear.
Lumbar Spine no change.

<u>BLOOD COUNT...</u>	REDS	..	7,264,000	LYMPHOCYTES	..	35%
	Whites	.	10,240	LARGE MONO	..	16%
	Hb.	..	95%	POLYMORPHS	..	46%
	C.I	..	65	EOSINOPHOLS	..	2%
				BASOPHILS	..	1%

The type associated with BECHTEREW's name complain of the gradually increasing stoop and the difficulty of seeing approaching traffic.

¹³
J.S. 62 Years. Male. Married. Engineer.

F.H. Nil.
Wife healthy. No M.C.
1 Child. healthy.

P.H. Healthy till age of 15. Then started to stoop
and walk badly.

R.H. 3 attacks of Rh. Fever: at 22 years lasted 5 months
" 32 "
" 44 " (slight)

Bad Tonsillar abscess 11 years ago.
22 yrs ago found pain in shoulders & loins
on stooping. Off & on for years. Got bad 15 yrs
ago, and was treated for it. Often was free of
pain for a year. Treated at R.M.W.H. in 1913. M.B.
6 mos ago pain got worse & had to give up work.
Now has pain across Back & Hips, down to knees.
Chiefly on rising & on using stairs. Soreness &
creaking of shoulders.

Bowels O.K.
Bladder O.K.
No V.D. History.
Difficulty in throwing off a cold.

Examination.

A big man with a marked stoop. Walks stiffly. Cannot bend properly. Feet very flat. Mentality good.

Teeth. Most absent. Rest carious, stumps.

Pyorrhoea.

Tonsils. Swollen, follicles distended.

Chest. Barrel Depressed Sternum. Marked Dorsal Kyphosis. Movements fair. Pain in D region.

Heart. N.A.D.

Abdomen. Nil.

Glands. Epitrochlear+ Tender. Inguinal Tender.

Reflexes. K.J.R.++L.+++ Plantar. Nil. Ankle. Nil
Feet are very flat & deformed.

X-rays. Dorsal spine appears very hazy in entire length, especially in lower two thirds. The Disc appear missing and there is Calcification of the Ligs. The Supra Spinous appears as a continuous line.

Lumbar Spine shows no change.

WASS. Negative.

G.C. Negative.

Blood Count.

REDS.	7,586,000	LYMPHOCYTES	40%
WHITES.	11,560	LARGE LEUCO	10%
Hb.	95%	POLYMORPHS	48%
C.I.	.63	EOSINOPHILS	1%
		BASOPHILS	1%

19

S.S. 24 yrs. Male. Single. Farm Labourer.

F.H. Nil.

P.H. Healthy until 13 yrs ago when he had a head injury. Traumatic epilepsy set in and lasted until 3 mos. ago. Trephined 6 mos, after injury and had no fits for 6 mos. 5 mos ago scar removed from dura. No fits for 1 month. Recurred, but disappeared under Luminal. No fits last 3 mos. Complains of gradual sagging of shoulders and head for last year, pain between shoulders. Pain in small of back on bending. Has periods free at times, then has to stop work. Gets colds more frequently, and harder to throw off. Has some dyspnoea.

Examination.

A well built man. Cervico-Dorsal stoop. Pain on pressure over 12th D.V.

Teeth. Bad. Pyorrhoea.

Tonsils. Swollen and Follicles prominent.

Chest. Well formed. Kyphosis upper D. Movements good.

Abdomen. N.A.D.
Glands. Nil.
Reflexes. All plus.
X-Rays. Ant.-Post view shows a very slight tendency to ossification of ligaments.

Blood Count.

REDS%	LYMPHOCYTES.
WHITES.	LARGE MONO.
Hb.	POLYMORPHS.
C.I.	EOSINOPHILS.
	BASOPHILS.

This is evidently an early case and it is hoped that something may be done to curb the disease.

The "Poker-Back" on the other hand complains that he cannot stoop at all. Case was a good example of this class. Many show signs of referred pain. "Lumbago and Sciatica", pain "in hips and groin", are commonly tendered histories.

F.H. 44 yrs. Male. Married. Carman.

F.H. Nil.

P.H. Healthy until 3 yrs ago. Then pain started in Lumbar region. Continuous ever since & getting worse for last 2 yrs.

No V.D. history.

Examination.

A well built man. Some difficulty in stooping.

Teeth. A few absent. Rest good.

Tonsils. N.A.D.

Chest. Full. Fair movements. Pain on the R side.
No Kyphosis.

Heart. N.A.D.

Abdomen N.A.D.

Glands. Nil.

Reflexes. K.J. faint. Rest normal.

X-Rays. Dorsal Spine very indistinct. Lower half appears as a fused mass. Ligaments obvious. Lumbar Spine shows no change.

Blood Count.

REDS.	LYMPHOCYTES.
WHITES.	LARGE.
Hb.	POLYMORPHS.
C.I.	EOSINOPHILS.
	BASOPHILS.

21
A.E.J. 49 yrs. Male, Married. Surface Labourer
Colliery.

F.H. No Rheumatic History.
Children: 4 living, 8 dead. Of these 7 died
shortly after birth.

No miscarriages.

P.H. Was a weakly child. No serious illness.
Army service 4 yrs. with Garrison Artillery
in France. No wounds or Trauma. Gassed
(Mustard) 1918, 3 mos. in Hospital.
Has been short of breath since then.
Frequent "Throats".

R.H. Indefinite history of general stiffness.
5 mos. ago got definite stiffness in small
of back, pain in L. groin & down back of
Thigh. Stiff shoulders.

Bowels. O.K.

Bladder. O.K.

No V.D. History.

Examination.

Well built man. Stands straight. Can't stoop
well.

Teeth. Most recently removed. Septic stumps.
Pyorrhoea.

Tonsils. Swollen.

Chest. Full. Kyphosis (D). Fair movements.
Abdominal breathing.

Heart. Muffled. N.A.D.

Abdomen. Full. Tender on palpation.

Glands. Epitrochlear+ Inguinal+ Tender.

Reflexes. Normal.

Nodules. Elbows.

Wass. Neg.

G.C. Neg.

X-Rays. Dorsal 5th & 6th. show absorption. 6-12
spaces lessened. Costo-Vert. joints fair.

Blood Count.

REDS.	LYMPHOCYTES.
WHITES.	LARGE.
Hb.	POLYMORPHS.
C.I.	EOSINOPHILS.
	BASOPHILS.

22

C.C. 50yrs. Female. Married. Housewife.

F.H.

P.H. Suffers from occasional "throats". Quinsy
twice. Periods stopped 2 yrs ago.

3 yrs ago complained of "Sciatica". Has had pain ever since in L.Hip and down thigh. 5 mos. ago pain in back became bad and hip and groin increased. Pain gradually developed in both knees and R. Shoulder. L. hand swells at times.

Examination.

A thin woman. No Kyphosis noticeable. Wasting of muscles general. Creaking of knees. F.F. Lumbar & Hip pain.

Teeth. All absent.

Tonsils Injected.

Chest. Flat. Poor movement.

Abdomen. N.A.D.

Heart. N.A.D.

Glands. Epitroch+ Inguinal+

Reflexes. Ankle J. absent. Rest normal.

WASS. Neg.

G.C. Neg.

X-Rays. Dorsal Spine. Loss of substance of most of bodies. Calcification of Lat. lig., and of Supra-Spinous Lig. Slight Kyphosis in upper part. The inter-vert. spaces of 2-6 Vertebrae appear lessened. Slight tendency to lipping of 12th D.-L.1st.

Lumbar Spine. Slight rarefaction of bones. Slight tendency to lipping upper border of 2nd.

Left Hip. Some alteration in shape of head of Femur and expansion of neck. Close approximation of bones.

Blood Counts.

REDS.	7,936,000	LYMPHOCYTES.	36%
WHITES.	11,200	LARGE LEUCO.	10%
Hb.	95%	POLYMORPHS.	52%
C.I.	.6%	EOSINOPHILS	1%
		BASOPHILS	1%

As the condition advances the pain may become greater or there may be "Still" periods. Sooner or later there is some difficulty in respiration owing to the fixation of the Costo-Vertebral joints. The chest does not expand as it should and the breathing tends to become abdominal in type. The patient will complain of the increasing frequency of colds, and of the difficulty in throwing them off. Pain may radiate round the ribs, as in the following case:

23.
A.D. 54 yrs. Female. Married. Housewife.
 No children. No M-C.

F.H. Nil.

P.H. Previously healthy except for indigestion.
 "Throats". 2 yrs ago pain started in R.knee.
 Swelling followed. Has remained. L.knee
 now affected. 8.mos ago pain in wrists and
 R. elbow. Now complains of pain in all
 joints with attacks of swelling and stiffness.
 Great pain about the ribs, and in the back.

Examination.

A pale, thin woman. Stoop L.M. of Shoulders.
 Swelling and creaking of the knee. Hips free.

Teeth. False.

Tonsils. N.A.D.

Chest. Flat; D. kyphosis. V. little movement.
 Pain on palpation.
 Stiffness over mid-spine.

Heart. N.A.D.

Abdomen. N.A.D.

Reflexes. Ankle. ? Rest normal.

X-Rays. Dorsal Spine. Scoliosis in middle to L.
 Rarefaction of bodies from 6th, down.
 Lessening of inter-vert. spaces.
 Ligaments show as a hazy line down sides
 of column.

Lumbar Spine. No change.

Knees. No bony changes except slight furring.
 Close approximation of bones.

Blood Count.

REDS.	3,268,000	LYMPHOCYTES	39%
WHITES.	9,280	LARGE MONO	2%
Hb.	60%	POLYMORPHS	58%
C.I.	.93	EOSINOPHILS	1%
		BASOPHILS	0%

In the ligamentous type the kyphosis becomes gradually more pronounced, and the poor man may be unable to stand on account of the alteration in balance. The head frequently becomes tilted, with a peculiar "Bird-Like" appearance. If, in addition to this the hips and shoulders become ankylosed, his plight is indeed terrible. Wasting of the muscles is an early feature, partly owing to disuse, and partly perhaps, to some Trophic disturbance. Constipation with its attendant train of evils sets in early. Headache, especially in the cases of Cervical type, is a fairly common symptom.

Occasionally one sees a case with a history of a sudden general onset of Arthritis. This strengthens

one's contention that Spondylitis is but one of a family.

24-

H.F. 43 yrs. Male. Married. Commercial Traveller.

F.H. Nil.

P.H. G.C. infection 20 yrs ago. Healthy otherwise.

Rh.H. Pains started 16 yrs ago. Stiffness in most Joints got bad 12 yrs ago. Then most joints became partially fixed. Elbows, wrists & knees are less involved but are getting worse. Great pain in hips, & back. Can't bend well, on account of stiffness. Comfortable when at rest. Treated at Droitwich 3 yrs ago. Autogenous Vaccine. No better.

Wass. Negative.

G.C. Test spoiled.

Examination.

Inspection. Fairly straight, but head is thrust forward and face turned up. Back is more or less rigid & has very little movement. Hips ditto. Knees swollen & creak of movement. Needs sticks. Shoulders painful & limited movement.

Teeth. A few absent. Rest good, except for slight Pyorrhoea.

Tonsils. N.A.D.

Chest. Kyphosis & Scoliosis (slight). Thin & flat Very poor movement.

Heart. Feeble, but N.A.D.

Abdomen. Compressed from above. Abdominal breathing.

Glands. Epitrochlear+. Inguinal+. Very tender.

Reflexes. Normal.

X-Rays.

Dorsal. Kyphosis, ossification of Anterior Ligament throughout. Discs appear much flattened. Bones rarefied. Slight lipping.

Lumbar. Lipping.

Hips. New bone formation about acetabulum and head of Femur.

Shoulders. Bones furred.

Blood Count.

REDS.

WHITES.

Hb.

C.I.

LYMPHOCYTES.

LARGE.

POLYMORPHS.

EOSINOPHILS.

BASOPHILS.

Symptoms relating to referred pain are rather misleading. The cases referred to earlier were of this type.

Everything considered, the symptoms and histories to be found in Spondylitis are about as mixed as possible.

DIAGNOSIS.

Anyone who has once seen a case of marked "Gardener's Back" is not likely to forget the picture. Similarly the typical "Poker-back" is a clinical picture that is striking. It is, however, the earlier cases, not to mention the obscure ones simulating other diseases, which prove such pitfalls for the unaccustomed observer. The majority of cases that one has had the advantage of examining, have either been "missed", or have come to the Hospital labelled "Pain in the back" or "Lumbago". So many complaints produce this very popular symptom that the hurried medical man is not to blame.

Undoubtedly the most useful arm of Medicine in the diagnosis of Spondylitis is the X-Ray plant. One has not even to wait for an autopsy! Any new bone formation or calcification of tissues will be shown in the Skiagram. KAHLMEYER stated a series of 1,065 plates taken of Asylum patients, he found 57 cases of Spondylitis amongst them. None of these cases had been recognised in the patient. The complete column must be carefully taken, and the angle varied. Otherwise a small area may not be shown. Exostoses and bridging of bone are fairly easily recognised, as is the atrophy of the bodies and Discs. It is the ligamentous changes that are so deceptive. In an antero lateral, or true lateral view the ant. lig. may show as a continuous line down the front of the column, but this may not be evident in an ant.-post. view. Here the typical sign is a fairly definite line running down the chest parallel to the vertebrae, at a distance of about $\frac{1}{4}$ " on each side. The extent varies with the site and the stage of disease. The general effect is of a cloudy sheath surrounding and sometimes obliterating all definition of the Spinal column. In early mild cases the costo-vert. joints are definite.

Frequently the supra-spinous lig. stands out as a solid line. One's experience has been that the

lower Dorsal vert. are most commonly involved and then the upper D. and Cervical. Something might be done in the nature of injecting the Theca with Lipodol or a similar substance, with a view to seeing if there were any hindrance to its passage. This, however, belongs to the province of the expert surgeon and the radiographer.

✓ Apart from an history of pain over the spine, the appearance of a patient in bed may help one. He is lying down and yet appears to be sitting up. This is very noticeable in the cases which have some ankylosis of the hips. Both back and legs appear to be in the air, as if the sacrum were being used as a point of balance, and the patient were see-sawing up and down. Another commonly observed symptom is the so-called "Bird's head" appearance. This at first may be due to an attempt on the patient's part to get a better view, but later there seems to be an involuntary contraction of the neck muscles, producing a typical "Wry Neck".

If the patient be asked to sit up straight and the examiner presses or percusses over each spine in turn, there is as a rule, some spot or area which is more tender than the rest. In true Typhoid Spine a slight swelling often appears, and there may be the other signs or a history of Typhoid to assist one.

In the case of KUMMELL's Disease, the history of Trauma is of assistance.

CURRAN & FOSTER report three cases in which a strain of the back led to the discovery of "Infective Spondylitis".

ELY gives a sign which he states is of use in the location of the site of a lumbar lesion. The patient is lying flat on his face. Each leg in turn is lifted and flexed by the examiner. The Pelvis on the injured side should rise.

The reflexes in Spondylitis are as a rule exaggerated; or they may be absent. The Epitrochlear glands easily palpable; the Inguinal glands are not greatly enlarged, but frequently tender.

DIFFERENTIAL DIAGNOSIS.

Syphilis has long been famous for the multiplicity of its forms and appearances, and Spondylitis is another condition that may simulate many other diseases. From what has already been

written, the difficulty of diagnosis will be appreciated. If Arthritis is exhibited in other joints there may not be so much difficulty, but the spinal form may choose to demonstrate itself in other ways.

Tuberculosis of the Spine. This disease has not been placed in the category of Spondylitis, because it is usually looked upon as an entirely different condition. Certainly there is talk of "Tubercular Rheumatism". In favour, Gonzales quotes one case of Sp. Rhiz. after T.B. Rheumatism of Poncet's type. The epiphyses were worn away, and he describes it as a dislocating arthritis. The patient improved under Tuberculin. Others have also mentioned PONCET's type, but on the evidence so far, there does not seem to be sufficient justification for the transitional type. Tubercle as a rule attacks the body of one or two vert., most commonly the Cervical, and carries off bone results. The subjects are younger, as a rule, children, It will, therefore, be in the adult variety that doubt will be felt. X-rays are very valuable. In the later stages, abscess formation, or the rapid progress of the disease should assist. Muscular spasm is a common feature, as is paralysis of limbs, more than in Spondylitis. Case 3 illustrates the difficulty sometimes confronting one. This man was supposed to be suffering from a Tuberculous knee. Up to the present there are no other signs of Tubercle, and it is rather doubtful if the original Diagnosis was correct.

MALIGNANT DISEASE OF THE SPINE.

This is rare, and again the Skiagraph must be employed. It occurs later in life as a rule, and there is generally the presence of a primary source to direct one. The rapidity of advance, along with great wasting, and general appearance of the patient is suspicious.

OSTEITIS DEFORMANS.

The larger bones are usually affected in this disease, a common starting place being the diaphysis of femur or thigh. There is rarefaction and new bone formation below the periosteum. Many or

all the bones may become attacked. Lengthening and bowing of the bones is common, and the attitude may become Simian. The skull is thickened and headaches are frequent. Kyphosis appears, in the upper dorsal region. Spontaneous fractures may occur. Case without a history of Rickets might prove very confusing. A congenitally long transverse process of the 5th Lumbar Vertebra may have to be excluded, as has already been stated in the section on Pathology. This may give rise to great pain in the Lumbar region. An X-ray would help matters very much, but the possibility of a co-existent Spondylitis must not be lost sight of.

OSTEO-MALACIA.

Some difficulty may be experienced in differentiating between Sp. and this condition. It affects women much more frequently than men, and tends to appear in pregnancy. The Lumbar Vert., and Pelvic bones become softened and deformity sets in. The case already referred to (1) is of interest in this connection. Spontaneous fractures may appear.

MYOSITIS OSSIFICANS PROGRESSIVA.

In Spondylitis a few cases have been reported as showing ossification of the vertebral muscles. In this disease as a rule, the ossification sets in within the muscle bundles, and X-Rays show thin plates of bone. These may fracture. Later, the fasciae, tendons and ligaments may become ossified. Fortunately the condition is rare, and is in no way connected to the ordinary ossification which takes place in muscles near damaged bone.

NERVOUS DISORDERS.

It is in this class that one meets with the greatest difficulty. Spondylitis has been known to simulate many of the recognised conditions. Where there is involvement of the meninges or of the cord or root pressure, this is what might be expected. A few autopsies have revealed changes. Pain is the commonest symptom, but various sensory disturbances are met with.

SYRINGOMYELIA.

This disease occasionally results in a kyphosis and may be mistaken for Spondylitis. A very careful investigation of the whole nervous system in such a case would be necessary. The loss of pain is one of the most prominent symptoms.

TABES DORSALIS.

A history of lightning pains etc, is equally referable to Spondylitis. If there be marked disease of the vertebrae as well, the possibility of both conditions should be remembered. COLDFIELD & LITTLE state that out of 111 cases of bone Syphilis, they found 9 cases of Spondylitis. 3 were Lumbar, 5 were Cervical, 1 was lower Dorsal.

The history and any other manifestations of Syphilis will help in diagnosis.

DISSEMINATED SCLEROSIS.

Case // demonstrated the possible confusion that may arise. BARREE writes that Spondylitis may simulate lesions of the Pyramidal Tract, incomplete Multiple Sclerosis, or Pott's Disease. MALLING does not consider that Spandylitis is a cause of Spastic paraplegia.

The age of onset of Disseminated Sclerosis is roughly 15 - 35 yrs. Symptoms occurring suddenly outside this period should direct attention to the possibility of Spondylitis.

Hysterical Spine, or Railway Spine. As these conditions sometimes appear after an accident, not necessarily to the back, one is occasionally confronted with a difficult problem, especially as a Law Suit may result, and the verdict turn on the medical evidence. Great care should be taken to distinguish any real muscular spasm. If necessary an Anasthetic should be given.

VARIOUS ABDOMINAL, THORACIC AND PELVIC CONDITIONS.

The most prominent symptom in any Abdominal condition is pain. The surgeon is called in and a laparotomy performed. Not at all frequently nothing abnormal, or at least sufficiently so, to account for the symptoms, is found. The literature bristles with records of cases which turned out to be Spondylitis.

VERNEUILL drew attention to the frequency of girdle pains and neuralgic pains in the thorax.

BLAINE has published two series of his cases in which the main symptoms pointed to Renal or Ureteral stone. Many of them showed bony changes near the kidneys.

VANDERHOOF, already quoted, gives a very interesting account of similar cases.

SMITH knows one case in which an operation for Chronic Appendicitis was performed; the Appendix was found to be quite healthy.

CHUTE noted the fact that besides the kidney symptoms he occasionally came across pain referable to the Prostate and S. Vesicle.

ALLEN & SQUIRES have met with similar cases and report one or two unsuccessful operations for supposed Chole-Lithiasis.

DICKSON & O'NEILL advise the use of X-Rays in all obscure cases.

The clinical picture in case 13 fits in with the above. The surgeon in charge says that he was very inclined to operate several times, but could not decide in his mind what would be found. Fortunately he resorted to an X-Ray examination.

It is more than likely that some of the vague pelvic pain which many women complain of is due to a mild form of Spondylitis.

COURSE AND PROGNOSIS.

Spondylitis seems to take one of two lines of advance. On the one hand is seen the rapidly crippling type with slight periods of comparative rest. On the other is the chronic, senile form, usually Osteo-Arthritis in character, which shows very little change from year to year. Many of the chronic "Sciatica's" and "Lumbagoes" belong to this class.

At best, however, the picture is a sad one. The patient gradually becomes more and more crippled, until complete ankylosis may result. The bowels become less active as time advances, and a chronic intoxication from this source does not tend to improve matters. The ribs tend to become fixed, and in the event of a bad chest complaint setting in the sufferer has not the power to expel any secretions.

He consequently drowns in his own fluids.

Treatment is considered in the next section. Many of the cases live to a ripe old age, but the majority are carried off by some intercurrent disease. Bronchitis and Pulmonary Tuberculosis are the commonest causes of death.

TREATMENT.

Many cases that are seen prove to be largely a matter of Academic interest. One must admit that there is no such thing as a cure for the condition any more than there is for the other forms of Arthritis. The most that may be looked for is alleviation of symptoms, and perhaps in some cases a cessation of activity.

Treatment is divided roughly into two classes:-

1. Some form of Spinal Support.
2. Local treatment such as Massage, etc.

If one is fortunate enough to catch a case in the early stage, an attempt should be made to immobilise the Spine in some way. Surgical measures have been tried in the past with some success. ALBEE'S Graft has frequently given good results. FINKELSTEIN has performed the operation several times. He gives the following indications for its use:-

1. Localised disease.
2. Early stages.
3. Acute exacerbation.
4. Cases in which a brace or support interferes with Abdominal breathing.
5. As a last resort.

FRAELICH, also is in favour of an Albee graft in suitable cases, and JAEGERINK reports 29 successful results from the same operation.

It would certainly seem to be most successful in cases of the Kummell type, and KUMMELL himself advises it in the recent cases. POLYA has devised a slightly different method of fixation. In 8 examples he resected a rib and fixed it between the arch and transverse process of the Vertebrae.

In the event of lipping or bridging giving rise to symptoms pointing to root-pressure, it has been suggested that an attempt at removal of the offending exostoses should be made. PLAZA said that his case which came to Autopsy, would have given every chance of success. ROBINEAU & GUTMANN mention two cases in which Laminectomy gave great relief, and also five cases of chronic Lumbago in which the symptoms disappeared after the same operation. At the same time it is not at all likely that the majority of Spondylitis cases would stand this interference. Imagine the position of a surgeon asked to remove the entire Ant. Ligament, or even cutting it in sundry places.

A few cases are on record in which long transverse processes of the 5th Lumbar Vertebra were successfully removed. THOMPSON & FOSSETT mention two, and BLANCHARD & PARKER a like number.

Operative treatment, is, however, not now so popular.

NON-OPERATIVE MEASURES FOR SUPPORTING THE SPINE.

Conservative treatment will always have a large following, and in the case of Spondylitis this is very much the case. Various types of support have been evolved, some ensuring complete immobility, others allowing slight movement.

Plaster casts at one time were considered the thing and still have champions. LANCE & JAUBERT found 14 cases of Peri-Spondylitis amongst a batch of 140 Pott's. They advise absolute immobility for the pain by means of plaster jackets, to be followed later by mobilisation and Heliotherapy. FRAELICH advocates this method in the case of Kummell's Disease. ROBERT JONES & JOHN RIDLOW made a long contribution on the treatment of spinal disease generally in 1892. There they advised the use of Plaster for early Spondylitis Deformans as well as for Tubercle. In his latest book on Orthopaedic Surgery he rather deprecates the use of plaster for the condition.

The chief objection of most workers to this method lies in the fact that any degree of immobility interferes with the respiratory and digestive processes. As the greater number of patients show some abdominal breathing, any pressure in that area is liable to hinder what is really only an apology for respiration.

Spinal jackets of leather, containing steel springs are most commonly employed nowadays. They

consist essentially of two long, flat strips of steel shaped to the back, but tending to produce an upright carriage. Slighter strips are carried part of the way round the abdomen, and fastened to each other with tapes or elastic. Shoulder straps are attached above, and suspenders reaching below the knees help to maintain the position of the apparatus. Soft leather is used throughout, and there is no pressure on chest or abdomen. Patients who are wearing the jacket say they feel more secure and no longer have muscular straining. BEER mentions 12 cases who improved greatly by this support. Extension should be tried in early cases which show rapidly advancing kyphosis. The usual plan consists in applying traction to the head by means of a special leather helmet. SIR. R. JONES advises this in some cases. WIENER uses an apparatus of this type and recommends a load not to exceed 10 lbs. It is, he says, most useful in cases which are most liable to get a pachy-meningitis, viz. upper four Dorsal Vertebrae. For other types he employs a corset such as HESSING'S.

The different methods described above have much to recommend them, and if the patient will continue to wear his support, improvement should follow. As a rule, however, once the novelty has departed, he gets tired of it. One has great difficulty in following up cases, and so the end result is frequently not known.

One or two attempts have been made to produce a cure by Protein Shock. RIST mentions one case of Spondylitis Rhiz, with a history of Gonorrhoea, that improved under Fibrolysin. He gave 24 subcutaneous injections of 2cc. each, of a solution containing 20 cgms. of Fibrolysin in 1 cc. distilled water. GRAF has tried Protein Therapy in two cases with some success. He gives a parenteral injection, following this later by remedial exercises such as swimming. Up to date, though our knowledge of this line of treatment is very incomplete. Other Arthritis cases have been treated in a similar manner, but on the whole results have been disappointing.

Vaccines have been prepared in one or two of the cases one has seen, from cultures prepared from septic teeth, tonsils, stools, cervix and Prostate. Two patients showed decided improvement.

Balenootherapy, combined with Massage, Radiant Heat, Ionisation, etc., cannot cure, but may do much towards the relief of pain and deformity. The usual treatment in this Hospital (The Royal Mineral Water Hospital, Bath), apart from the use of supports, is as follows :

If the patient is so crippled that he cannot stand, he is put into a Tepid Reclining Bath at a temperature of 99° F. for 10 minutes. If able to move about he is given a Deep Bath at the same temperature and for the same time. In this Bath the water supports the weight of the limbs and body to a great extent and he is able to move about with less pain. The cripple may graduate to the Deep Bath, or may be lowered on a special chair. Aix massage is tried in the slighter cases. Bathing takes place every other day. On the alternate days Radiant heat over the Spine and other affected parts or Ionisation, is the treatment. General massage tones up the wasted muscles and aids digestion. Zander Exercises and remedial exercises help in the same way. The majority of cases show improvement after about 'six weeks' treatment, which often lasts for months. Patients frequently return for further courses. The following case shows what may be done :

25
F.W. 47 years. Male. Married. Cycle Repairer.

F.H. Nil.

P.H. Healthy until 1915. Then noticed neck getting very stiff, Followed by tenderness over spine. Spa treatment for a month enabled him to return to work. Bad in 1918. Was bent almost double. Treated here in 1923 and 1924. Very much better, and straighter. Has very little pain; only stiffness.

Examination.

Stoop in Neck and upper Dorsal. No movement.

Teeth. False. All removed on account of sepsis.

Tonsils. Follicles distended.

Chest. Barrel; marked Cervico-D. kyphosis Bunching of muscles. Very little movement in neck.

Expansion good.

Abdomen. N.A.D.

Reflexes. Plus.

X-rays. Cervical shows Ant. & Post Ligs. bridging the spaces, esp. in 2, 3, 4. Mid-Dorsal no definition at all. Supra-Spinous Lig. Stands out.

<u>Blood Count.</u>	Reds. 7,536,000	Lymphocytes. 42%
	Whites. 12,960	Large 10%
	Hb. 92%	Polymorph. 47%
	C.I. 61	Eosinophils. 0%
		Basophils. 1%

The first words of this man on his admission were "Can I go into the Gymnasium. It did me the world of good last time I was here. I was bent double and it has straightened me up wonderfully."

Drugs.

Except for incidental use drugs are useless. In those cases which show signs of glandular deficiency, one of the appropriate preparations on the market should be tried. Thyroid given in doses of $\frac{1}{2}$ gr. twice a day to start, has proved useful.

With a definite history of Syphilis or Gonorrhoea, or positive evidence of their presence, energetic treatment should be carried out. Remarkable improvement sometimes results. BANCHIERI, COLDFIELD & LITTLE, and SACHS report success in this type. RAMEL, who holds largely to the theory of G.C. origin, says that if anti-G.C. treatment is started early there should be good results.

When everything has been said, however, one must admit that the whole question of treatment is still very unsatisfactory.

In conclusion, one would like to thank the following gentlemen for the permission given to make use of the cases in their Wards : Drs. Waterhouse, Lindsay, Vincent Coates, Gordon, and Nixon. Mr. Levis; also Dr. Munro for Laboratory facilities.



I

CONCLUSIONS.

- 1..Spondylitis Deformans is much commoner than is generally believed.the majority of cases are not diagnosed as such until the condition is far advanced.Many cases of chronic Lumbago and Sciatica will repay a very thorough investigation.
- 2..Spondylitis is not a distinct disease.It is a manifestation of Arthritis.There is no justification for naming many types as separate entities.The only possible separation is between the Ligamentous and the Osteo-Arthritic.Even here our knowledge is very incomplete.Both may be found in the one subject.
- 3..No particular organism is responsible.A few cases do occur as the result of some specific acute infection, but the majority appear to be the result of a Chronic Intoxication.Septic Foci,in Teeth,Tonsils,or Bowel, are often found.
- 4..The Blood Picture,with its Anaemia and Leucocytosis, points to an Intoxication.
- 5..There is in all probability some Metabolic Disturbance. This may either prepare the ground,or may follow on an Intoxication.The final result is the formation of a vicious cycle.
- 6..Heredity cannot be held to play a great part.All that can be said is that some people may be predisposed to the condition.
- 7..Trauma and Exposure are very important factors in the Etiology.
- 8..The deformity produced depends largely on the first point of attack and on the rate of advance.
- 9..The general prognosis is Bad.
- 10.Treatment is unsatisfactory,but much may be done in the way of alleviation of symptoms.Massage,Electricity,Balneology and Remedial Exercises are most useful.Some form of Spinal Jacket must be employed. If the man must have a stiff back,he is better off as a "Poker-Back",than as a "Gardener's Back!"

BIBLIOGRAPHY

- BANCHIERI.....Policlin., Rome, May 29, 1921, 28, No. 21.
BARREE J.A....Med. Paris, Feb., 5th, 1924.
BECHTEREW?VON.Dent.Zeits.f.Nervenh.1897,XI,327.
 " " Neural.Vestnik.(Russich),1897,v.Hft.I.
 " " Deut.Zeits.f.Nervenh.,1899, XV,52.
BEER B......Wiener Klin.Wochensch.,Vienna,Dec.3,XXVI,49.
BLAINE.....J.A.M.Assn.Nov.II,1916.
 " " Am.J.Roentgenol.,4,I22,1917.
BLANCHARD &
 PARKER.....A.J.Orth.Surg.XIII,1915,p.250.
CHUTE.....Boston M.& S.J.,I51;563,1904.
CLUZET..... 1919.
COLDFIELD &
 LITTLEJ.A.M.Assn.Jan.I7,1925.
CURRAN &
 FOSTER.....J.Indust.Hygiene,Boston,Nov.I4,1921,II8.
DICKSONILL
 O'NEILL....Surg.Gynec.& Obst.I5,552,1912.
ELY.....A.J.Orth.Surg.,Oct. XII,No.2,p.201-278.
FINKELSTEIN...Ann.Surg.,1916,LXIV,713.
FRAELICH.....Congress of French Orthopodists,on War Sp.
GRAF K......Munchener Medizin.Wochenschr.,Munich,
 70:725-760,(June 8),1923.
HENLA.....Arch.f.Klin.Chir.,52:I,1896.
HIBBS.....J.A.M.Assn.,Sept.,8,1917.
HOLSTI O......Finska Lakaresallskapets,Handlunga.,
 Kelsingfors,6.6:I53-354,April,1924.
JAEGERINK T.A.Nederlandsch.Tijdsch.v.Genesk.,Amsterdam,
 Jan.8,1921,I,202.
~~JENTZER~~
FOSDICK JONES.J.A.M.Assn.Dec.I,1923.
ROBT.JONES &
 J.RIDLOW....Contrib.Orthop.Soc.,ProvincialM.J.1892.
JONES SIR R...."Orthopaedic Surgery".
KAHLMETER....Svenska Lakaresallskapets,Handinger,Stock-
 holm,June 30,1918,44.
KAUFMANN....Monatsschr.f.Unfallheilk,1895,No.6,p.169.
KUMMELL...."Deutsche med Woch.",1895,p.180.
 " " Archiv.f.klinische Chir.,Berlin,
 Nov.24,1921,II8.
LANCE &
 JAUBERT.....Revue de Chir.,Paris,p.607.
LERI.....Rev.de Med.,1899,XIX,597,691,801.
KER.C.B......"Manual of Fevers".
MALLING.....Hosp.Tid.,Copenhageh,Mar.6,1918,6I,No.10.
MCCRAE.....A.J.M.Sc.Dec.,1906.
MARK R......Morristown,N.Y.J.,4:I254,July-Aug.,1923.
MUNRO.....Lancet,I:1922.

- NATHAN.....A.J.M.Sc., Nov, CLII, No. 5, 667.
MAX GONZALES
OLACHEA.....Chronica Medica, Lima, 40:193-224, 1923.
PALMER F.S......Lancet, Nov., 20, 1923.
PEGNIEZ.....Archives Franco-Belges de Clin., Brussels,
 26:711-806 (Aug.) 1923.
PLAZA.....Prensa Medica Argentina, B.A., Mar. 30,
 1918, 4, No. 39.
PENDE.....Policlin., Rome, Dec., 1919, 26, p. 441.
POLYA.....Zentralblatt f. Chir., Leipzig, June 25,
 1921, 48, No. 25.
RAMEL.....Annals des Maladies Venerien., Paris,
 18, 177-256, March, 1923.
RICHARDS A......A.J. of Roent. VI, Sept. 1919, No. 9.
RIST. ME......Soc. Med. des Hop. de Paris, Dec. I, 1911.
ROBINEAU &
GUTMANN.....Bull. de la Soc. Med. des Hop. Par.
 Dec 30, 1921, 45, No. 39.
RUFFER, SIR A......J. of Path. & Bact., Vol. 22, 1918-1919.
SACHS B......A.J.M.Sc., 1916.
SCHOU.....Hosp. Tid., Copenhagen, Feb. 5, 1919, No. 6.
SCHULTZ.....Beitrz. Klin. Chir., 27:363, 1911.
SMITH.....U.S. Med. Naval Bulletin, 2, 6, 1907.
STRUMPELL....."Lehrbuch", 1884, XI. 2s. 152.
TOMASONE.....Riforma Medica, Naples, 40:913-936,
 Sept. 29, 1924, p. 913.
THOMPSON &
FOSETT.....North West M.J., June, 1923.
VANDERHOOF.....J.A.M. Assn., 1919, 1689.
VERNEUIL.....Bull. d'Acad. de Med., 1892, No. 39, p. 496.
WATSON, CHALMERS......B.M.J., I:1900.
WIENER.....Zentralbl. f. Chir. 1908, XXXV, 252.
WHITNEY &
BALDWIN.....J.A.M. Assn. No. 23, Dec. 4, 1915.

Additional.

- ALLEN &
SQUIRES.....Southern Med. J., Birmingham, 1918, XI, 373-377.
COATES V. &
RAIMENT.....Biochemical J., XVIII, No. 5, 1924.
KRAMER &
TISDALL.....J. Biol. Chem., 1921, 47, 475.
KRAMER....." " " 1923, 56, 437.
LERI.....Rev. de Med. 1899, XIX, 597.
LERI & FOLLET.....Rev. Neurol. 1900, IIII.
LL. JONES....."Arthritis Deformans", 1909. (Wright).
MARIE.....) DeClin. Med. 1893.
 " ".....Rev. Med. 1898, 785.
MARSHALL.....Lancet, Mar., 1920.
MODINOS.....Par. Med., May 28, 1921.
TURNER P......Ztschr. f. Orth. Chir., Band XXXIV, Heft 3-4
 1914.

Tabulated Results of the Various Tests.

CASE.	WASS.R.	G.C. F.	REDS.	WHITES.	Hb.	C.I.	CALCIUM.
1.	Neg.	Neg.	7,460,000.	12,160.	92%	.62	-
2.	Neg.	Pos.	5,680,000.	10,720.	95%	.84	-
3.	Neg.	Neg.	6,592,000.	11,840.	91%	.7	4.9mgs.
4.	Neg.	Neg.	5,764,000.	10,000.	60%	.52	-
5.	Neg.	Neg.	7,568,000.	4,470.	85%	.56	-
6.	Neg.	Pos?	7,488,000.	12,800.	92%	.63	10.2 "
7.	Pos.	Pos.	7,369,000.	10,880.	91%	.62	-
8.	Neg.	Neg?	-	-	-	-	-
9.	Neg.	Pos.	-	-	-	-	-
10.	Neg.	Neg.	-	-	-	-	-
11.	Neg.	Neg.	6,816,000.	8,640.	94%	.69	-
12.	Neg.	Neg.	-	10,880.	-	-	10.2 "
13.	-	-	4,576,000.	12,160.	70%	.76	-
14.	-	-	-	-	-	-	-
15.	Neg.	Neg?	6,944,000.	14,880.	91%	.65	-
16.	Neg.	Pos.	7,456,000.	19,840.	90%	.6	10 "
17.	Neg.	Neg.	7,264,000.	10,240.	95%	.65	10.2 "
18.	Neg.	Neg.	7,586,000.	11,560.	95%	.63	10.2 "
19.	-	-	-	-	-	-	-
20.	-	-	-	-	-	-	-
21.	Neg.	Neg.	-	-	-	-	"
22.	Neg.	Neg.	7,936,000.	11,200.	95%	.6	10 "
23.	Neg.	Neg.	3,268,000.	9,280.	60%	.93	10.5 "
24.	Neg.	?	-	-	-	-	-
25.	Neg.	Neg.	7,536,000.	12,960.	92%	.61	11 "

From the above Table it will be seen that in 21 cases Complement Fixation Tests were carried out. 1 Wass. was found sharply Positive, although there were no signs of active (or passive), diseases. The same man showed a Positive G.C. Fixation.

4 were definitely Positive to G.C. Fixation.

4 were doubtful Positives " " "

There is still much doubt as to the value and dependability of the G.C. Fixation Test.

Nine estimations of Blood Calcium were made. Of these 8 were between 10 - 11 mgs. per 100 c.c.s. The remaining one is of doubtful value as there may have been a mistake in measuring the Serum.

The Blood Picture is fairly constant. 3 cases show a lower Red count and in these the Hb. is also lower. Only 1 case shows a low White Count.

To face Page I of Photographs.

1...Typical attitude of Kyphotic Type.
Case 24.

2...The limit of bending .Note slight
flexion of Knees.
Case 8

3...Attitude almost identical with 1.
Case 5.

4...Note prominence of Dorso-Lumbar region.
Case 8.

5...Example of Achondroplasia, old Rickets,
and Spondylitis .Note bowing of Tibiae.
Case 2.

6. Maximum Extension of R. Thigh.
Case 5



I



2



3



4



5



6

To face P.2 of Photographs.

1...Showing angle of Hips when sitting.
Case 2.

2...This patient was unable to flex the
thighs. Note pose of head. Neck is stiff.
Case 24.

3...A marked degree of Kyphosis. Back and neck
both fixed.
Case 4.



I



2



3

To face P.3 of Photographs.

1...Showing wasting of thigh muscles.
Partial ankylosis of R.Hip.
Case 5.

2..."Bird-like" poise of head.Note
transverse creasing of Abdomen.
Case 5.

3...Straightness of back.Is bent
to full extent.
Case 2.

4...Shows prominent eyes.This man
exhibited a slight Goitre.
Slight Wry-Neck.Chest fixed.
Case 4.



1



3



2



4

To face P. 4 of Photographs.

1...X-Ray print of spine of Case 5. Note
Tendency to Lipping. Note Supra-Spinous
Ligament is ossified.

2...Typical picture of average appearance
of Spine with Anterior Ligament in-
volved. Cervical Region.

3...Same film as No. 1. Note Ligament.



1



2



3

To face P. 5 of Photographs.

1...Lat.-Ant.view of Dorso-Cervical Spine,
showing Anterior Lig.as a continuous line.
Case 15.

2...Typical X-Ray of ossification of Ligaments.

3...X-Ray of Museum Specimen (R.U.Hosp.,Bath),
No.ii, showing new-bone formation.Telescoping
of one body.Note new bone at a distance from
injury.

1



2



3



To face P.6 of Photographs.

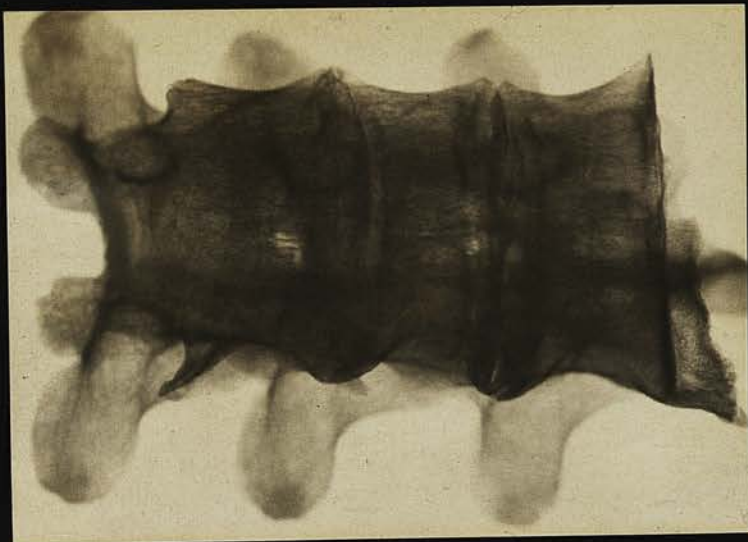
1...Museum Specimen, No.iii. Shows typical
Lipping and Bridging.

2...Photo. of above Specimen.

3...Photo of Specimen No.i, Ant. Lig. on
Cervical Vertebrae. is continuous
with bone.

4.X-Ray of Specimen No.i, showing
ossification of ant.Lig.

I



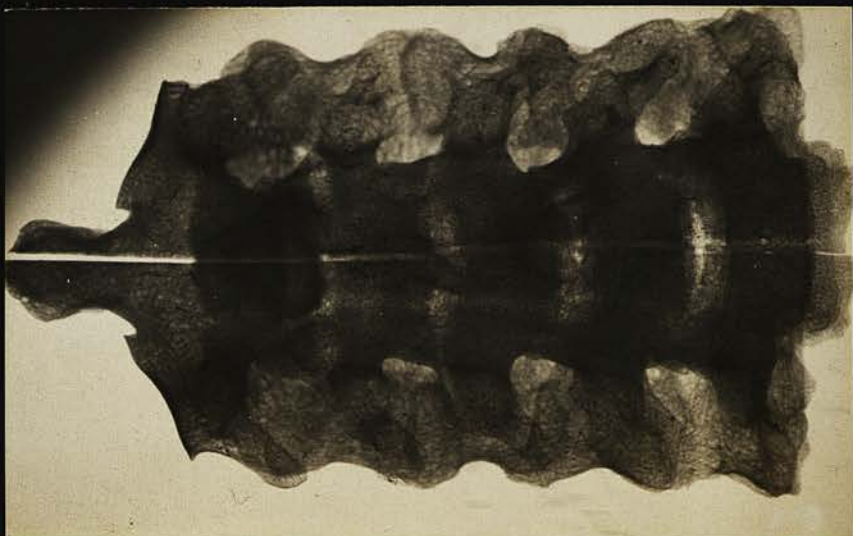
2



3



4



To face P. 7 of photographs.

1.....Shows shadow referred to in text, Slight
 lipping. Porosity of bodies. Lessening
 of Inter-Vert. spaces.

2.....X-Ray of Case 2. showing scoliosis and
 thinning of bodies of Vert.

3.....Front view of Jacket described.

4.....Side view to show "Poker back".
 Case 7.

5.....Back view of Jacket.



I



2



3



4



5